1 tgggtgtgtcccttgctctgccaacgttgttgattgttttcatgacattaatctacgtgc
1 Met Thr Leu Ile Tyr Val

61 cttcaatatttacaatggtcccctcaatcacacggattgtactggttaacattctgttgg
7 Pro Ser Ile Phe Thr Met Val Pro Ser Ile Thr Arg Ile Val Leu Val Asn Ile Leu Leu

121 cgacgttggttttgggagctgcagtccttccacgagacaacagaactgtttgcgggagtc
27 Ala Thr Leu Val Leu Gly Ala Ala Val Leu Pro Arg Asp Asn Arg Thr Val Cys Gly Ser

181 aactctgcacatggtggcacgactccggcgagataaacaccggtactcctgtacaggcag
47 Gln Leu Cys Thr Trp Trp His Asp Ser Gly Glu Ile Asn Thr Gly Thr Pro Val Gln Ala

241 gaaacgttcgacaatcccgaaagtactctgtccatgtgagcctggcagaccgtaaccaat
67 Gly Asn Val Arg Gln Ser Arg Lys Tyr Ser Val His Val Ser Leu Ala Asp Arg Asn Gln

301 tctacgactctttcgtatatgaatcgatacctaggaacggcaatggcagaatttattctc
87 Phe Tyr Asp Ser Phe Val Tyr Glu Ser Ile Pro Arg Asn Gly Asn Gly Arg Ile Tyr Ser

361 ccaccgacccacctaacagcaatacattgaatagtagcattgacgacggtatatcaatcg
107 Pro Thr Asp Pro Pro Asn Ser Asn Thr Leu Asn Ser Ser Ile Asp Asp Gly Ile Ser Ile

421 aaccatctctcggcatcaacatggcttggtcccagttcgaatatagacgagatgtcgaca
127 Glu Pro Ser Leu Gly Ile Asn Met Ala Trp Ser Gln Phe Glu Tyr Arg Arg Asp Val Asp

481 ttaagattactacaatcgatggctcaatattggatggccctttggacattgttattcggc
147 Ile Lys Ile Thr Thr Ile Asp Gly Ser Ile Leu Asp Gly Pro Leu Asp Ile Val Ile Arg

541 cgacttctgttaagtactcagtcaaaagatgtgtgggtggtatcattattagagtccctt
167 Pro Thr Ser Val Lys Tyr Ser Val Lys Arg Cys Val Gly Gly Ile Ile Ile Arg Val Pro

601 atgatcccaatggtcgaaaattctctgttgagttaaagagtgacctttacagttacctct
187 Tyr Asp Pro Asn Gly Arg Lys Phe Ser Val Glu Leu Lys Ser Asp Leu Tyr Ser Tyr Leu

661 ccgacggttcgcaatatgtgacctctggagggagcgtggttggtgtggagccaaaaaatg
207 Ser Asp Gly Ser Gln Tyr Val Thr Ser Gly Gly Ser Val Val Gly Val Glu Pro Lys Asn

721 ccctggtgatctttgccagccctttcttgccacgggatatggttcctcatatgacaccac
227 Ala Leu Val Ile Phe Ala Ser Pro Phe Leu Pro Arg Asp Met Val Pro His Met Thr Pro

781 acgacacccagacaatgaagccgggcccaatcaataatggggactgggttcaaagccta
247 His Asp Thr Gln Thr Met Lys Pro Gly Pro Ile Asn Asn Gly Asp Trp Gly Ser Lys Pro

841 tactctacttcccgcctggcgtatactggatgaacgaggatacctctggtaaccccggga
267 Ile Leu Tyr Phe Pro Pro Gly Val Tyr Trp Met Asn Glu Asp Thr Ser Gly Asn Pro Gly

901 agctcggctcaaatcatatgcggctggatcccaatacctactgggtccatctagccccag
287 Lys Leu Gly Ser Asn His Met Arg Leu Asp Pro Asn Thr Tyr Trp Val His Leu Ala Pro

961 gagcctatgtgaaaggagccattgagtatttcacgaagcaaaatttctatgcaacgggtc
307 Gly Ala Tyr Val Lys Gly Ala Ile Glu Tyr Phe Thr Lys Gln Asn Phe Tyr Ala Thr Gly

1021 atggcgttctctcaggtgagaactatgtttatcaggccaatgcagctgataactactatg
327 His Gly Val Leu Ser Gly Glu Asn Tyr Val Tyr Gln Ala Asn Ala Ala Asp Asn Tyr Tyr

1081 ccgtcaagagtgatggcacaagcttgagaatgtggtggcacaacaaccttggaggcggtc
347 Ala Val Lys Ser Asp Gly Thr Ser Leu Arg Met Trp Trp His Asn Asn Leu Gly Gly Gly

1141 aaacatggttttgcatggggcccaccattaatgcaccgccgtttaatacgatggacttca
367 Gln Thr Trp Phe Cys Met Gly Pro Thr Ile Asn Ala Pro Pro Phe Asn Thr Met Asp Phe

1201 acggaaactctaatatttccagccggattagtgactataagcaggttggcgcttattttt
387 Asn Gly Asn Ser Asn Ile Ser Ser Arg Ile Ser Asp Tyr Lys Gln Val Gly Ala Tyr Phe

1261 tccaaacagacggaccggagatctacgaggacagtgttgtccatgacgtcttctggcatg
407 Phe Gln Thr Asp Gly Pro Glu Ile Tyr Glu Asp Ser Val Val His Asp Val Phe Trp His

1321 ttaatgatgatgccatcaagacatattattccggagcttcaatttcacgagcaaccatct

FIG. 1a

427 Val Asn Asp Asp Ala Ile Lys Thr Tyr Tyr Ser Gly Ala Ser Ile Ser Arg Ala Thr Ile

1381 ggaagtgtcacaatgacccgatcatacagatgggctggacgtcacgaaatctcaccggaa
447 Trp Lys Cys His Asn Asp Pro Ile Ile Gln Met Gly Trp Thr Ser Arg Asn Leu Thr Gly

1441 tcagcattgataacctgcacgtcatccacacgagatatttcaaatctgaaacagtggttc
467 Ile Ser Ile Asp Asn Leu His Val Ile His Thr Arg Tyr Phe Lys Ser Glu Thr Val Val

1501 cttcagcaatcattggagcgtctccattctacgcaagtggaatgactgttgatcccagcg
487 Pro Ser Ala Ile Ile Gly Ala Ser Pro Phe Tyr Ala Ser Gly Met Thr Val Asp Pro Ser

1561 agtccatcagcatgaccatctctaacgtggtgtgtgagggtctatgcccctcactgttcc
507 Glu Ser Ile Ser Met Thr Ile Ser Asn Val Val Cys Glu Gly Leu Cys Pro Ser Leu Phe

1621 gtatcactccgcttcagagctacaacaaccttgttgtcaagaacgtggcctttcccgatg
527 Arg Ile Thr Pro Leu Gln Ser Tyr Asn Asn Leu Val Val Lys Asn Val Ala Phe Pro Asp

1681 gactgcagacaaatccaatcggaataggagagagcattataccagcagcttccggctgta
547 Gly Leu Gln Thr Asn Pro Ile Gly Ile Gly Glu Ser Ile Ile Pro Ala Ala Ser Gly Cys

1741 caatggacttggaaatcacaaactggaccgtcaaaggacaaaaagtcaccatgcaaaact
567 Thr Met Asp Leu Glu Ile Thr Asn Trp Thr Val Lys Gly Gln Lys Val Thr Met Gln Asn

1801 ttcagtccgggtcacttggccagttcgatatcgatggttcatactggggtcaatggtcca
587 Phe Gln Ser Gly Ser Leu Gly Gln Phe Asp Ile Asp Gly Ser Tyr Trp Gly Gln Trp Ser

1861 taaactaaagctattcccattcacctgagtattttcgtgggttcaatgagttcttgttac
607 Ile Asn *

1921 tgatggggcccttgctagtggtaaaagtagagggacttgtcctcgccgggcgccaaggaa
1981 gttcatgtcttctagttgaatagtatttgtttcttctctctcgttaaaaaaaaaaaaaaa
2041 aaaaaaaaaaaa 2052

FIG. 1b

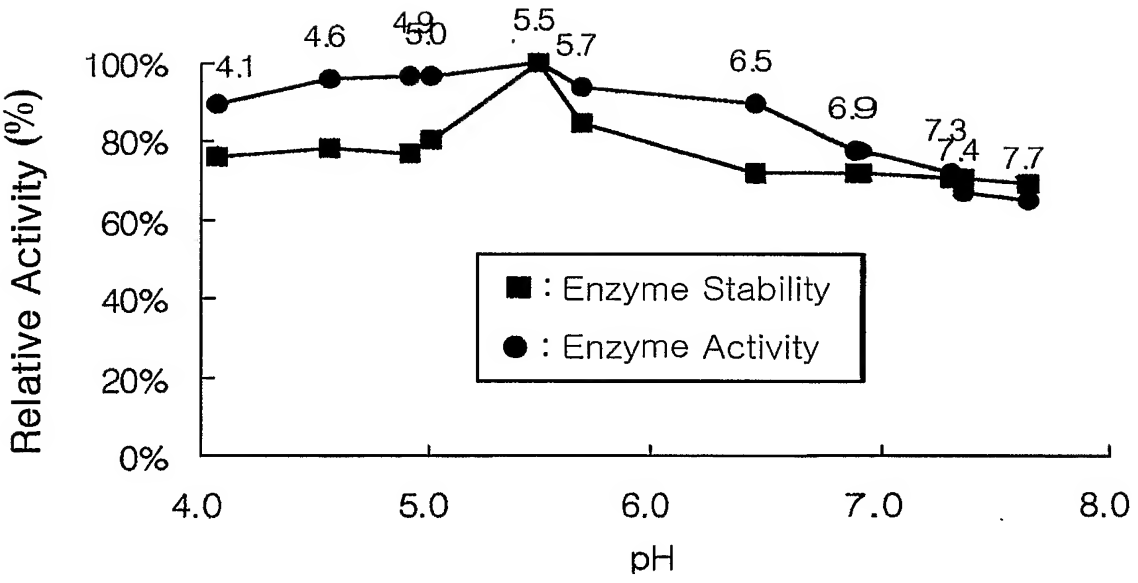
Relative Activity (%)
100%
80%
60%
40%
20%
0%
4.0
5.0
6.0
7.0
8.0
pH
4.1
4.6
4.9
5.0
5.5
5.7
6.5
6.9
7.3
7.4
7.7
■ : Enzyme Stability
● : Enzyme Activity

FIG. 2

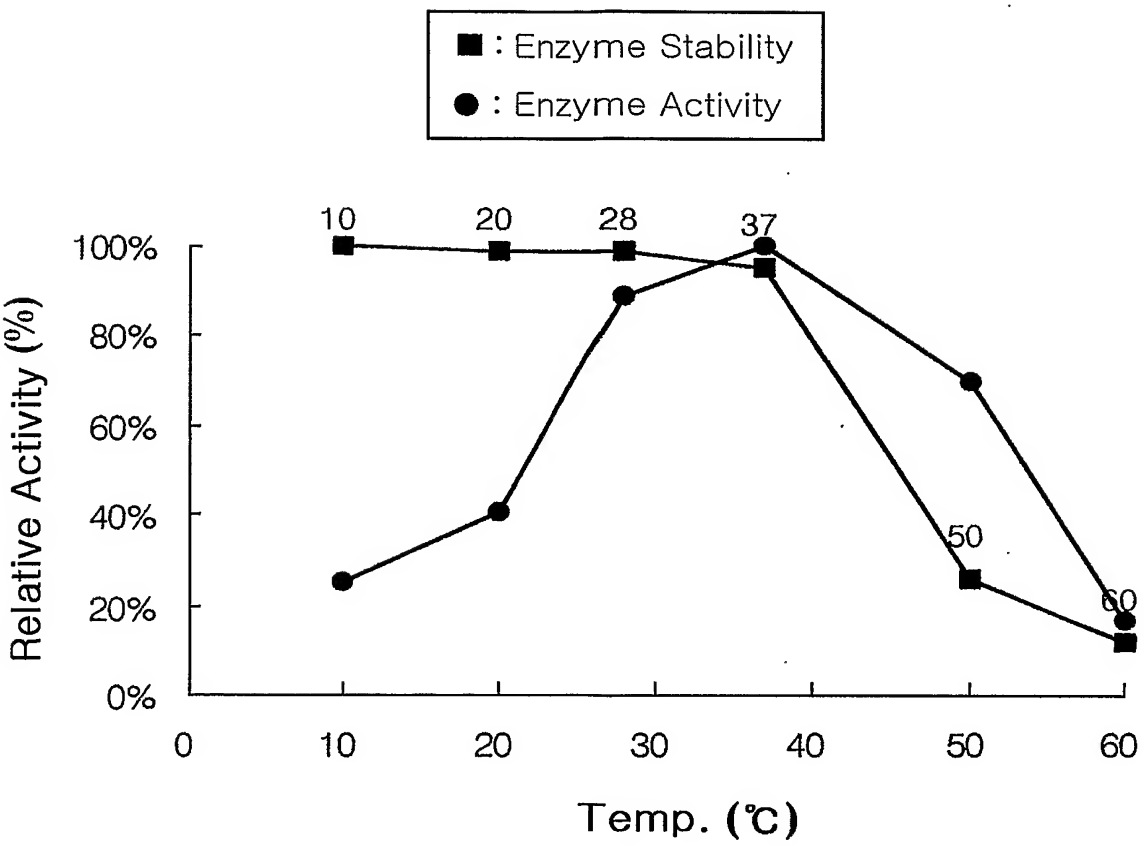
■ : Enzyme Stability
● : Enzyme Activity
Relative Activity (%)
100%
80%
60%
40%
20%
0%
0
10
20
30
40
50
60
Temp. (℃)
10
20
28
37
50
60

FIG. 3

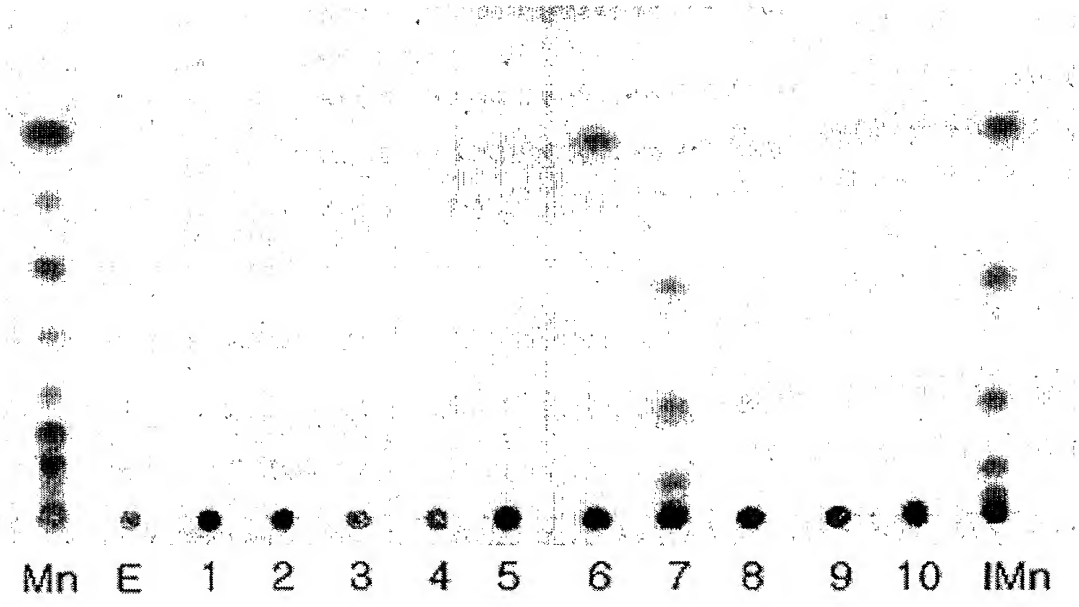

FIG. 4

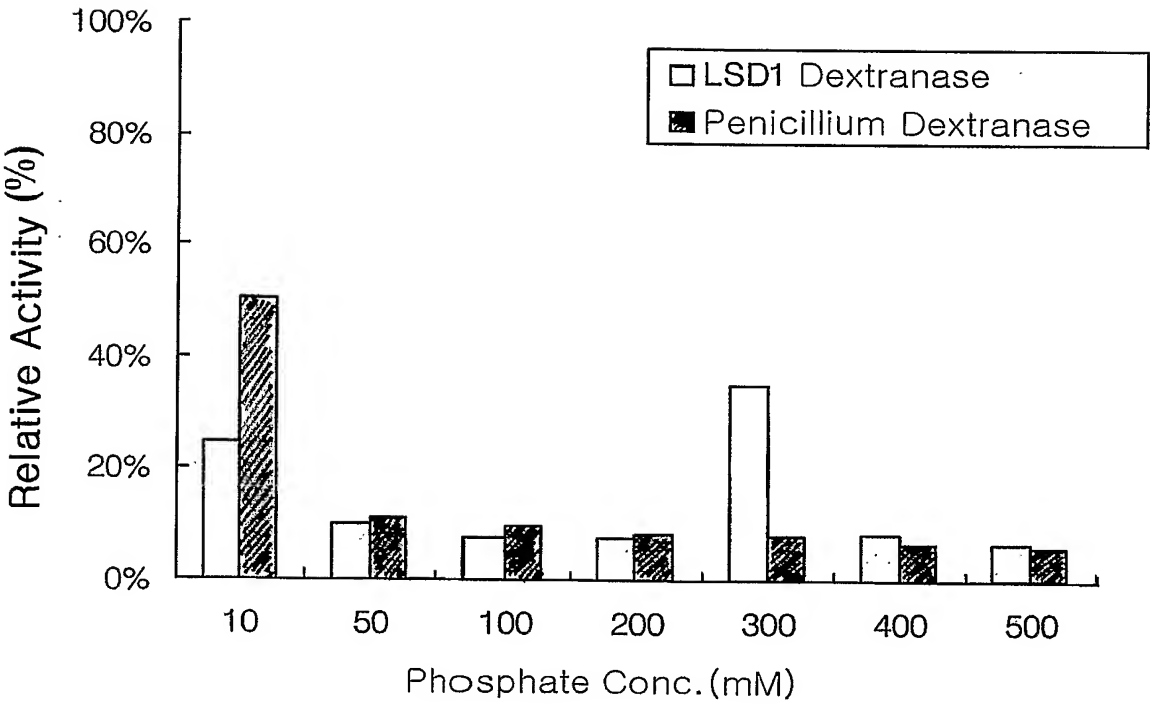
100%
80%
60%
40%
20%
0%
Relative Activity (%)
LSD1 Dextranase
Penicillium Dextranase
10
50
100
200
300
400
500
Phosphate Conc.(mM)

FIG. 5